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BSI Standards Publication

Safety of machinery — Electro-sensitive protective equipment

Part 4-3: Particular requirements for equipment using vision based protective devices (VBPD) — Additional requirements when using stereo vision techniques (VBPDST)

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee MCE/3, Safeguarding of machinery.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Safety of machinery – Electro-sensitive protective equipment – Part 4-3: Particular requirements for equipment using vision based protective devices (VBPD) – Additional requirements when using stereo vision techniques (VBPDST)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 61496-4-3, which is a technical specification, has been prepared by IEC technical committee 44: Safety of machinery – Electrotechnical aspects.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
44/711/DTS	44/722/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part is to be used in conjunction with IEC 61496-1:2012.

This part supplements or modifies the corresponding clauses in IEC 61496-1:2012 to specify particular requirements for the design, construction and testing of electro-sensitive protective equipment (ESPE) for the safeguarding of machinery, employing vision based protective devices (VBPD) using stereo vision techniques (VBPDST) for the sensing function.

Where a particular clause or subclause of Part 1 is not mentioned in this Part 4-3, that clause or subclause applies as far as is reasonable. Where this part states "*addition*", "*modification*" or "*replacement*", the relevant text of Part 1 shall be adapted accordingly.

Clauses and subclauses which are additional to those of Part 1 are numbered sequentially, following on the last available number in Part 1.Terminological entries (in Clause 3) which are additional to those in Part 1 are numbered starting from 3.4301. Additional annexes are lettered from AA onwards.

A list of all parts in the IEC 61496 series, published under the general title *Safety of machinery – Electro-sensitive protective equipment*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

An electro-sensitive protective equipment (ESPE) is applied to machinery presenting a risk of personal injury. It provides protection by causing the machine to revert to a safe condition before a person can be placed in a hazardous situation.

The working group responsible for drafting this technical specification was concerned that, due to the complexity of the technology, there are many issues that are highly dependent on analysis and expertise in specific test and measurement techniques. In order to provide a high level of confidence, independent review by relevant expertise is required. They considered that if this high level of confidence could not be established these devices would not be suitable for use in safety related applications.

SAFETY OF MACHINERY – ELECTRO-SENSITIVE PROTECTIVE EQUIPMENT –

Part 4-3: Particular requirements for equipment using vision based protective devices (VBPD) – Additional requirements when using stereo vision techniques (VBPDST)

1 Scope

Replacement:

This part of IEC 61496 specifies requirements for the design, construction and testing of electro-sensitive protective equipment (ESPE) designed specifically to detect persons or parts of persons as part of a safety-related system, employing vision-based protective devices (VBPDs) using stereo vision techniques (VBPDST) for the sensing function. Special attention is directed to features which ensure that an appropriate safety-related performance is achieved. An ESPE may include optional safety-related functions, the requirements for which are given in Annex A of IEC 61496-1:2012 and this Technical Specification.

This part of IEC 61496 does not specify the dimensions or configurations of the detection zone and its disposition in relation to hazardous parts for any particular application, nor what constitutes a hazardous state of any machine. It is restricted to the functioning of the ESPE and how it interfaces with the machine.

The detection principle is based on the evaluation of images from different viewing points (stereoscopic view) for the determination of distance information. This distance information is used to determine the location of an object(s).

– This part of IEC 61496 is limited to vision based ESPEs with distances (stereo base) and directions between the different imaging devices fixed during manufacture.
– It is limited to vision based ESPEs, with a minimum distance from the sensing device to the detection zone of 4 times of the stereo base.
– It is limited to vision based ESPEs that can detect objects with at least 5 pixel diameter in the image plane.
– It is limited to vision based ESPEs that do not require human intervention for detection.
– It is limited to vision based ESPEs that detect objects entering into or being present in a detection zone(s).
– It is limited to VBPDSTs employing radiation at wavelengths within the range 400 nm to 1 500 nm.
– This part of IEC 61496 does not address those aspects required for complex classification or differentiation of the object detected.
– This part of IEC 61496 does not consider the aspects of a moving ESPE installation.

Additional requirements and tests can apply in the following cases:

– Use of multi-spectral (colour) techniques;
– Setups other than as shown in Figures of 4.1.2 (e.g. changing backgrounds, horizontal orientation of the optical axis with respect to the floor);
– Intended for outdoor applications.